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AUTHORITY
onr ltr, 4 may 1977

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NATIONAL RESEARCH CORPORATION
NORTON
Research Division
70 MEMORIAL DRIVE • CAMBRIDGE, MASSACHUSETTS • 02142

~~Research Division~~
NATIONAL RESEARCH CORP~~ORATION~~
~~70~~ Memorial Drive
Cambridge, ~~42,~~ Massa~~chusetts~~

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QUARTERLY LETTER REPORT

~~COVERING~~

January 1, ~~1964~~ - March 31, 1964,

THERMODYNAMIC PROPERTIES
OF
BIMETALLIC COMPOUNDS,

Mr. Ludwig Fasolino
~~El~~ 4-5400 Ext. 320

Contract ~~Number~~: Nonr-3608(00)
ARPA Order Number: 23-61
Proj~~ect Code Number~~: 3910
Contract Date: 15 September 1961
Expiration Date: 14 November 1964
Contract Amount: $233,769.00

Approved by: Allen L. Klibanoff
Allen L. Klibanoff
Program Director

Reviewed by: Frank J. Salomone
Frank J. Salomone
Contracts Manager

Submitted to:

Advanced Research Projects Agency
The Pentagon, Room 3D-159
Washington 25, D. C.

Attn: Advanced Propellant
Chemistry Office

March 31, ~~1964~~,

MAJOR ACCOMPLISHMENTS

SOLUTION CALORIMETRY

A. Calibration

The silvered, dewar-type reaction vessel in which the heats of solution of B_2O_3 (amorphous), B_2O_3 (crystalline), and H_3BO_3 are to be measured was electrically calibrated under adiabatic conditions, giving an energy equivalent, $\mathcal{E}$ = 2.946 $\pm$ 0.004 cal/ohm.

B. Heat of Solution of B_2O_3 (amorphous)

Prior to sealing, each sample was dried at 200°C under vacuum. Five determinations of the heat of solution of amorphous B_2O_3 in water were made yielding the following results:

$$\Delta H_{298} = -7.737 \pm 0.049 \text{ kcal/mole}$$

C. Heat of Solution of H_3BO_3

Prior to sealing, each of the samples was dried over magnesium perchlorate overnight. Five determinations of the heat of solution gave,

$$\Delta H_{298^\circ} = +5.094 \pm 0.006 \text{ kcal/mole}$$

All of the precision errors listed above were calculated as twice σ.

D. Preparation of Crystalline B_2O_3

Crystalline B_2O_3 was prepared by heating a seeded quantity of H_3BO_3 to 260°C for 36 hours or longer. The solidified product will next be pulverized and analyzed prior to sample preparation.

PROBLEMS ENCOUNTERED

None

ACTION REQUIRED BY ARPA

None

FUTURE PLANS

The heats of solution of crystalline B_2O_3 is to be measured next. Following this, the heats of solution of BCl_3 and BF_3 will be measured.

Upon completion of the heat of solution of crystalline B_2O_3, a special report will be written covering the details of the work thus far which will have enabled the determination of the heats of formation of B_2O_3 (crystalline) and B_2O_3 (amorphous), and the energy of transformation, B_2O_3 (crystalline) --------> B_2O_3 (amorphous).

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